SOIL conservation

U. S. Department of Agriculture
Soil Conservation Service
September 1974

From the Administrator

'Creative Conservation' in Fort Union

Perhaps for the first time in the history of this country, we have the opportunity, on a large scale, to plan how land will be used *before* it has been surface mined.

This opportunity concerns the Fort Union geological formation—one of the world's largest coal reserves. Its thick coal seams range from 50 to 300 feet and run through four states—Montana, Wyoming, North Dakota, and South Dakota.

The projected removal of these reserves makes Fort Union one of the most critical areas in the nation today in terms of land use planning.

Without question, the first step in making reclamation plans is to complete soil surveys of the area.

Congress, industry representatives, state and local agencies, conservation districts, and others are urging us to accelerate soil survey work in the Fort Union area.

We have altogether about 34 million acres yet to be mapped in the Fort Union area—16 million in Montana, 8 million in North Dakota, 6 million in Wyoming, and 4 million in South Dakota.

Once an area has a soil survey, we can—before mining begins—work through conservation districts to help the rancher or farmer or company plan a suitable land use for the time when the seam has been removed. Topsoil can be stockpiled, the mining operation managed, and the land shaped, all with the goal in sight of good land for range, recreation, crops, or wildlife.

The thick seams in the Fort Union area also mean that only a small acreage need be exposed at any one time. A fairly large operation I visited this summer in Wyoming indicated it never expected to have more than 80 acres in actual mining at any one time. Under such conditions, there's no reason a viable ranching operation couldn't be run at the same time that coal removal is going on. It's a challenge to us to help set the standards to enable such operations to be compatible.

We need to do this work before the fact, not after. And we need the basic inventory of the resource first.

The Service came into being at a time when dust was blowing off the plains, when corrections of past mistakes were needed.

Today, with four decades of experience behind us, we have the opportunity to plan ahead at Fort Union, to overtake a problem, and to carry out what can be termed "creative conservation" to help people there deal with both energy and environmental concerns.

Kenneth E. Grant

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Secretary of Agriculture

Kenneth E. Grant, Administrator
Soil Conservation Service

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Contents

2 From the Administrator

4 Center Focuses on Conservation Plants
Diane Rude Foose

6 Conservation Measures Aid Yankton Sioux
John M. Cross

8 'Durar' Hard Fescue: 'Grass of All Trades'
John L. Schwendiman

10 Native Plants Studied in Lake Tahoe Area
Jack R. Carlson and John C. Buckwalter

11 Pines on a High Salt Diet
Cluster R. Belcher and Frederick B. Gaffney

12 The Meaning of Mosaics
Hubert W. Kelley

16 'Tryouts' Underway for Plants To Stabilize Surface-Mined Land in Kentucky
H. Wayne Everett and Donald S. Henry

17 Conservation District Raises 'Pluglings'
Max D. Bolar

18 Joint Venture Benefits Ranchers, Range
Harmon S. Hodgkinson

20 'Cape' American Beachgrass Anchors Dunes
Frederick B. Gaffney

21 Recon

22 Soil surveys

23 Reviews

23 Meetings

COVER: Gilbert Lovell, manager of the Soil Conservation Service's National Plant Materials Center in Beltsville, Maryland, takes notes on a clover which is being evaluated as a potential livestock forage and ground cover. See story on page 4.

Started in 1938

Center Focuses on Conservation Plants

by Diane Rude Foose
Information Division, SCS, Washington, D.C.

When things get too uncomfortable in the greenhouse at night, an alarm goes off in Gilbert Lovell's bedroom.

Lovell, manager of the Soil Conservation Service's National Plant Materials Center in Beltsville, Maryland, is thus the first to be warned when temperature or humidity changes are great enough to endanger the rare and valuable seedlings for which he is responsible. He and his family live at the Center full time to provide the constant attention necessary.

The 140-acre National Center is part of SCS's effort to find new plants or adapt older ones that can help to solve soil and water conservation problems. It's one of 20 plant materials centers around the country, from Hawaii to New Jersey, that SCS either operates or cooperates with in some way.

Seeds gathered from around the world are nurtured at the Beltsville Center. Once a plant shows potential value for some conservation use, the seed or plants are produced and distributed by the National Center to be "environment-evaluated" at other plant materials centers where they seem most likely to adapt.

Work is also done, both at the National Center and at centers around the country, in seed culture for both native and foreign plant species.

The goals of SCS plant materials specialists include finding plants to stabilize waste disposal areas . . . extend grazing seasons . . . improve windbreaks and shelterbelts and reduce air pollution, snow drift damage, and wind erosion.

The specialists are also seeking "fire-retardant" plants to replace highly flammable brush, as well as to help with more "normal" needs: plants to stabilize and beautify such prime sediment sources as surface-mined lands, highway slopes, recreation sites, and urban and

Lovell and John Kimmons, soil conservationist, check markers used for plants evaluated for reducing roadside erosion.

industrial development areas.

The National Plant Materials Center gets its experimental seeds and cuttings, both foreign and domestic, from USDA's Agricultural Research Service (ARS) Plant Introduction Stations, from the ARS Germplasm Resources Laboratory at Beltsville, from State Agricultural Experiment Stations, from SCS field people and from seed and nursery companies.

Since 1938, the National Plant Materials Center has received and observed more than 23,000 plants.

Once a plant has been tested and found to give a superior performance, it is released to seed growers and nurserymen for commercial production.

SCS keeps limited amounts of each seed and plant that is released in order to make grants to conservation districts, schools, and laboratories.

The National Center also acts as a coordination point for requests for seeds from other plant materials centers.

When requested seeds are available, the National Center arranges to have them sent out. In cases where a requested seed may not have been introduced into the United States, arrangements are made with the Agricultural Research Service to collect the seed during the next ARS exploration trip to the native country of the sought-after plant.

Over the years, more than 110 plants have been released through the plant materials system of SCS and cooperating agencies.

Examples include 'Cardinal' autumn olive, 'Emerald' crownvetch, 'Latar' orchardgrass, and 'Lana' woollypod vetch.

'Cardinal' autumn olive yields a large quantity of red fruit—individual plants have been known to produce 90 pounds. This fruit ripens in the fall but remains on the plant until late winter, making the plant attractive to large numbers of birds. Planted in hedgerows, 'Cardinal' autumn olive screens noise, dust, and wind.

The National Plant Materials Center first began observing autumn olive—a native of the Far East—in 1940. The strain 'Cardinal' was released in 1963 by the Big Flats Plant Materials Center in Big Flats, New York, after it showed outstanding characteristics as a wildlife food in the East and Midwest.

'Emerald' crownvetch provides ground cover so dense that it is capable of camouflaging litter thrown along roadsides. Used for stabilizing and beautifying highway banks, revegetating strip-mine spoils, providing pasture, and landscaping commercial areas, industrial sites, and parks, 'Emerald' crownvetch is in great demand as a plant that protects the environment.

Discovered by a plant exploration team to southeastern Russia in 1911, it was released jointly by SCS and the Iowa Agricultural Experiment Station in 1961. Today, its white to reddish-purple blossoms can be seen along highways from the East Coast to eastern Nebraska and Kansas in the summer.

'Latar' orchardgrass, brought to this country from a 1934 expedition to Russia, is well known as a conservation plant in the northwestern and northern United States. A quality feed when combined with legumes in hay, pasture, and silage, 'Latar' orchardgrass was released in 1957 by the Pullman and Aberdeen Plant Materials Centers and Agricultural Experiment Stations in Washington and Idaho.

'Lana' woollypod vetch contributes $6 million annually to the economy of California from grazing alone. It's been seeded on 600,000 acres of California's rangeland which is dominated by annual vegetation. There, it helps control medusahead, one of the worst range weeds in both Oregon and California. It's also used to stabilize roadsides and as an emergency ground cover on brushburned areas where it can control erosion and flooding. Brought to the United States from southwestern Turkey in 1936, the plant was released by SCS and the University of California Agricultural Experiment Station in 1960. ♦

SUMMER JOB IN THE GREENHOUSE

This summer, the National Plant Materials Center had its first female plant sciences technician on the staff.

Marion Filby brought to the job a background in plant taxonomy, plant physiology, and greenhouse plant propagation—plus a desire to make botany a career.

At the National Plant Materials Center, Miss Filby maintained young plants in the greenhouse, harvested seed, helped with plant propagation, and took care of a cold frame.

Other experiences valuable to the future botanist included helping set up an irrigation system, hoeing and weeding, filing seeds in the Center's walk-in refrigerator, and weighing and sending out seeds requested of the National Center.

Conservation Measures Aid Yankton Sioux

by John M. Cross
Information specialist, SCS, Lincoln, Nebraska

Though it may be a lot smaller than many other reservations in the state of South Dakota, the Yankton Sioux Indian Reservation at Greenwood had a mighty big conservation problem.

Silt flowing out of the steep Missouri River bluffs above the little village of Greenwood has damaged a 104-year-old church, endangered homes, and encouraged the tribe's young people to move away in search of jobs as their village declined.

The Yankton Sioux moved to the little village of Greenwood in 1856, 2 years before their chiefs signed the Yankton Treaty with the United States.

Holy Fellowship Episcopal Church, built there in 1870, was the first Episcopal Cathedral in South Dakota and one of the state's first churches. In recent years, silt built up around the church's foundation until the building had to be raised to prevent it from rotting.

Percy Archambeau, tribal chairman of the Yankton Sioux Tribe, and Lyle Laberee, coordinator for the Randall RC&D Project, examine the inlet of the principal spillway of the grade control structure built to protect the village of Greenwood, South Dakota.

Something had to be done.

In the spring of 1966 Tribal Chairman Percy Archambeau, Soil Conservationist Roy Lemke of the Bureau of Indian Affairs, and church officials asked the Randall Resource Conservation and Development Project (RC&D) for help.

In 1970, the Department of Housing and Urban Development proposed to build 30 housing units for Indian families at Greenwood. Tribal Chairman Percy Archambeau knew that the building process, coupled with existing soil erosion problems, would bring havoc to Greenwood.

"We were concerned with their problems," said Marvin Larson, chairman of the Randall Resource Conservation and Development (RC&D) Project Council. "We knew we would not only be helping the tribe but we would help the entire area by reducing the silt going into the Missouri River."

The RC&D Council and the Yankton Sioux teamed up with the Charles Mix Conservation District governing body and county commissioners to stop the silt and end the washing away of a road fill in the village. What was once that troublesome road fill has been rebuilt into a grade stabilization structure with a road across the top of the dam.

Tribal Chairman Archambeau had been trying to find a way to get the water through Greenwood when RC&D Project Coordinator Lyle Laberee and other SCS staff came up with the idea of diverting it around the village.

A 1,470-foot diversion was built along the bottom of the steep slope above the village. Water from the diversion flows into a vertical 72-inch riser and out through a horizontal 60-inch barrel to the Missouri River without damage.

The Yankton Sioux Tribe moved to Greenwood in 1856—2 years before the signing of the Treaty with the United States.

Young Indian families are now moving back to Greenwood. The tribe owns controlling interest in a pork processing plant in nearby Wagner and some villagers are employed at the processing plant. Children ride their bicycles along Greenwood's streets between the new homes without worrying about mud.

A scenic parkway being built through the area by the state of South Dakota is completed as far as Greenwood. Travelers are able to stop at a monument built on a hill above the village to honor the Indian chiefs who signed the 1858 treaty. Tribal Headquarters and Holy Fellowship Church welcome visitors—and visitors appreciate no longer having to wade through mud. Land above the headquarters and church has been treated and covered with native grasses to slow runoff.

Soil Conservation Service employees assisting the Randall RC&D Project estimate $3,205 in annual benefits resulting from the erosion and sediment control measure—$1.70 for every dollar spent. Greenwood residents believe there are also many nonmonetary values in preserving a village, new dwellings, or a 104-year-old church. ♦

As a ground cover in this black locust woodlot, 'Durar' hard fescue shows its shade tolerance and its effectiveness as a ground cover and weed suppressant. 'Durar' hard fescue is used on roadsides, ditchbanks, and as an orchard cover crop.

'Durar' Hard Fescue: 'Grass of All Trades'

by John L. Schwendiman
Plant materials specialist, SCS, Pullman, Washington

Ten years ago, the American Society of Agronomy registered an improved variety of grass called 'Durar' hard fescue.

Today, some call it "the grass of all trades."

Over the years, it has lived up to its name and more. Not only is it durable, as its name implies, but it is versatile, with new uses being found every year.

One of the newest: it is being used as cover for ski slopes to hold the soil in place, and retard competing shrubs and trees. An unexpected measure of its durability is that youngsters are sliding down the grass in summer as well as on snow in winter.

'Durar' hard fescue has proved to be a grass of many uses: as rough turf, ground cover, and as a soil builder. It is used along roadsides, on mine spoils, around farm ponds, terraces, diversions, and ditchbanks, and around farm airports.

'Durar' hard fescue, of European origin, came from an old introduction test planting at the Eastern Oregon Livestock Experiment Station at Union, Oregon, where the Pullman, Washington, Plant Materials Center of the Soil Conservation Service had plots seeded for observation.

Hard fescue is the European

counterpart of Idaho fescue, green fescue, and Arizona fescue, all of which are native to western United States. It is also closely related to commercial chewings fescue and sheep fescue.

In extensive comparison tests with many strains of these grasses, 'Durar' hard fescue showed favorably as to longevity, durability, palatability, and adaptability. It was far ahead in ease of establishment and seed production. More than 1,000 pounds of clean seed per acre have been produced at the Pullman Center.

One of the first field plantings of what came to be known as 'Durar' hard fescue was on a roadside seeding in Washington's Douglas Soil Conservation District in cooperation with the county highway department. Made in a dry year, the planting developed slowly. In 2 years, there was complete cover. In 8 years, the original planting had expanded to 10 times its original size through volunteer plants established from seed scattered by traffic up and down the road.

Current seeding recommendations are 5 to 10 pounds of seed per acre, mixed with an equal amount of 'Nordan' crested wheatgrass. The wheatgrass establishes readily and, in fewer than 5 years, 'Durar' hard fescue takes over completely.

This mixture has been adapted and widely used by the highway departments of Washington and adjacent states on silt loam soils in 12- to 20-inch rainfall zones. 'Durar' hard fescue is unexcelled for conservation seedings with its heavy, fibrous root system.

In alternate rows with 'Ladak' alfalfa, it produces over 11,000 pounds per acre of air dry roots in the surface 8 inches of soil. This is in addition to 8,000 pounds produced by alfalfa in the mixture and almost twice as much as alfalfa produces when planted alone.

In range seedings, orchard cover crops, woodlot plantings, and on fairgrounds, 'Durar' hard fescue holds soil in place.

It was the principal grass used on the Farragut, Idaho, recreation area where worldwide and national Boy Scout Jamborees have been held.

'Durar' hard fescue is competitive and it suppresses weeds. Seeded in a goatweed area on the snow, after a fire, or after chemical treatment, 'Durar' hard fescue has prevented the weed from setting seed and nearly eliminated it. The same thing has happened with patches of Canada thistle and other noxious weeds.

On roadside and in farmyard seeding 'Durar' hard fescue requires little care. Although it makes a heavy seed crop the year after planting, in subsequent years few stems are produced, and the long basal leaves provide complete ground cover. Leaves stay green late into the season and provide some protection from fire.

'Durar' hard fescue, a nearly universal grass in north temperate climate, requires good drainage. It has been used from sea level to 10,000 feet and from Arizona and New Mexico to Alaska, where it is one of the grasses considered for revegetation. This hardy grass has found its way east where it has demonstrated potential possibilities for use on coal mine spoils.

'Durar' hard fescue is effective for revegetation of other disturbed areas, for wildlife cover plantings, for conservation seeding, and no doubt for a myriad of yet undiscovered uses. ♦

Short Course on Erosion Control Offered in Olympia

A short course on erosion control brought a capacity audience earlier this year in Olympia, Washington.

Experts from state, federal, and private agencies spoke on the course theme of "Soil Erosion, Prevention, and Sediment Control."

Among those from the Soil Conservation Service on the program were Stan Swanson, manager of the Plant Materials Center at Corvallis, Oregon, and Stan Hobson, state conservation engineer at Spokane, Washington. Swanson discussed the use of legumes and other plants for cover, and Hobson talked about stream alignment control.

Topics ranged from vegetative cover on critical areas to use of ornamental plants to highlight esthetic values.

Among those attending were timber managers, highway and county road engineers, landscape architects, foresters, soil conservationists, wildlife biologists, and land developers.

The short course was sponsored by the Cooperative Extension Service, Washington State University. Cochairmen were Joseph Buhaly, Extension forester, and Stanton E. Brauen, Extension agronomist, both from the Western Washington Research and Extension Center, Puyallup, Washington.

Among those assisting in the planning were the Soil Conservation Service, the Washington Departments of Ecology, Natural Resources, and Highways, and Washington Irrigation and Development, Inc.—by W. H. Billings, *plant materials specialist, SCS, Corvallis, Oregon.* ♦

Native Plants Studied in Lake Tahoe Area

by Jack R. Carlson and John C. Buckwalter
Soil conservationist, SCS, Lockeford, California, and Chairman, Tahoe-Verdi Soil Conservation District, Incline Village, Nevada

What's ahead for Lake Tahoe?

Some residents are interested in developing the area into the nation's most popular resort . . . others want to return it to nature . . . still others want it as a nice place to live.

But there's another group of residents interested in only one thing: survival.

These residents are plants . . . and their survival depends on keeping soil on the mountains and out of Lake Tahoe.

That's the project tackled by the Tahoe-Verdi Soil Conservation District, with the assistance of the Soil Conservation Service's Plant Materials Center at Lockeford, California.

They're working to develop and put native plants in areas where there is a great need to stabilize the soil: areas denuded by highway construction, shopping centers, condominiums, casinos, and ski slopes. Ugly manmade cuts and abrasions need to be healed with green cover.

A number of native plants can do the job . . . but they need help in propagation and in getting established.

For instance, many of the native species have seeds that germinate sporadically over many years, making survival in the harsh environment of the Sierra Nevada possible. However, germination must be uniform and timely in the nursery.

Native shrubs, bitterbrush and greenleaf manzanita, invade a cut slope.

Work at the SCS center and elsewhere has meant that most of the native species can now be propagated by special treatment to induce germination.

Among the plants being looked at for the Lake Tahoe area are squaw carpet, pinemat manzanita, and mountain pride —all attractive and effective ground covers. Larger shrubs include greenleaf manzanita, big sagebrush, whitethorn, snowbush, bitterbrush, and bush chinquapin. Attractive mixtures of these well-adapted plants give the landscape variety.

Establishing these native species on sites much harsher than where they grow naturally is a tough job. Studies are being conducted in such areas as nursery container sizes, spring versus fall planting, mulches, controlled release fertilizers, and irrigation. Needs are being determined for what it takes to establish plants on different slopes and exposures.

Results are encouraging. Mountain pride, squaw carpet, big sagebrush, and bitterbrush have been established with minimum treatment.

The natural invasion of native

shrubs and trees alone is not enough to stop disturbed soil from eroding into the streams and into Lake Tahoe. The decomposed granitic soils around Lake Tahoe are very unstable, once denuded, and quick stabilization by other means is needed.

Good, fast covers are produced by 'Sherman' big bluegrass, 'Luna' or 'Topar' pubescent wheatgrass, 'Latar' or 'Potomac' orchardgrass, and 'Fairway' crested wheatgrass seeded in various combinations, with suitable mulching. Slopes can't be graded any steeper than 2 feet of horizontal distance to 1 foot vertical drop.

Once the slope is stable, it is then ready for the invasion or the introduction of native shrubs to give permanent and natural protection and to restore the region's esthetic quality. ♦

PINES ON A HIGH SALT DIET

by Cluster R. Belcher and Frederick B. Gaffney
Soil conservationist and manager, Cape May Plant Materials Center, SCS, Cape May Court House, New Jersey

It's enough to send chills down the back of any gardener, but Soil Conservation Service plant specialists in New Jersey are applying generous amounts of rock salt around pine seedlings.

Mission: to find pines resistant to salt water and salt spray along the seacoast.

Testing four pine species—white pine, Austrian pine, pitch pine, and Japanese black pine, the plant specialists have found Japanese black pine to be the most salt-tolerant and white pine to be the least.

The tests began at the plant materials center in Cape May with an application rate of 4,000 pounds of rock salt per acre back in March 1971. This stunted the growth of all the seedlings.

The next spring, salt was again applied at the same rate. And again, Japanese black pine showed little damage. Its terminal growth was reduced by 3 inches, while terminal growth on the other three species was reduced by 4 to 8 inches.

In yet another test, rock salt was applied at the rate of 16,000 pounds per acre to seedlings in other plots.

Only a single seedling survived. This "super seedling," again a Japanese black pine, has since been transplanted to a better site and will be used as a seed source.

Plant specialists at Cape May Court House are continuing their work to select a Japanese black pine that will be highly tolerant of salt either in the soil or in the air. Both the Soil Conservation Service and the Forest Service are cooperating in this project.

The Japanese black pine was introduced into the United States near the end of the last century from the coast of Japan. Noted for its deep green needles throughout the winter, it is winter hardy as far north as Long Island, New York ♦

At Cape May, Donald Hamer, Sr., SCS biological technician, checks the Japanese black pine that survived a rock salt application equivalent to 16,000 pounds per acre. This "super seedling" is maintained for a future seed source.

The Meanin

Last spring, the first cloud-free "photomaps" of the 48 contiguous states and Alaska were assembled from satellite images. The work was done by the Soil Conservation Service for the National Aeronautics and Space Administration (NASA). Technically called "mosaics," each of the 16-foot-long "maps" is composed of 595 black-and-white images obtained from an altitude of 560 miles by NASA's first Earth Resources Technology Satellite (ERTS-1). One set of images uses the red portion of the visible spectrum (Band 5), and shows land use patterns clearly. The second mosaic uses images in the near infrared part of the spectrum (Band 7), and shows water, including stream and river systems. To get some notion of the importance of the new "photomaps" to scientists and laymen, SCS Information Director Hubert Kelley interviewed Dr. Roy A. Welch, associate professor of geography, University of Georgia, as they examined the Band 5 map in the lobby of the Geological Survey National Center in Reston, Virginia.

Map buff Roy A. Welch, who teaches geography at the University of Georgia, explains why the 10- by 16-foot SCS mosaic of the United States gives scientists a new perspective on this country.

# of Mosaics

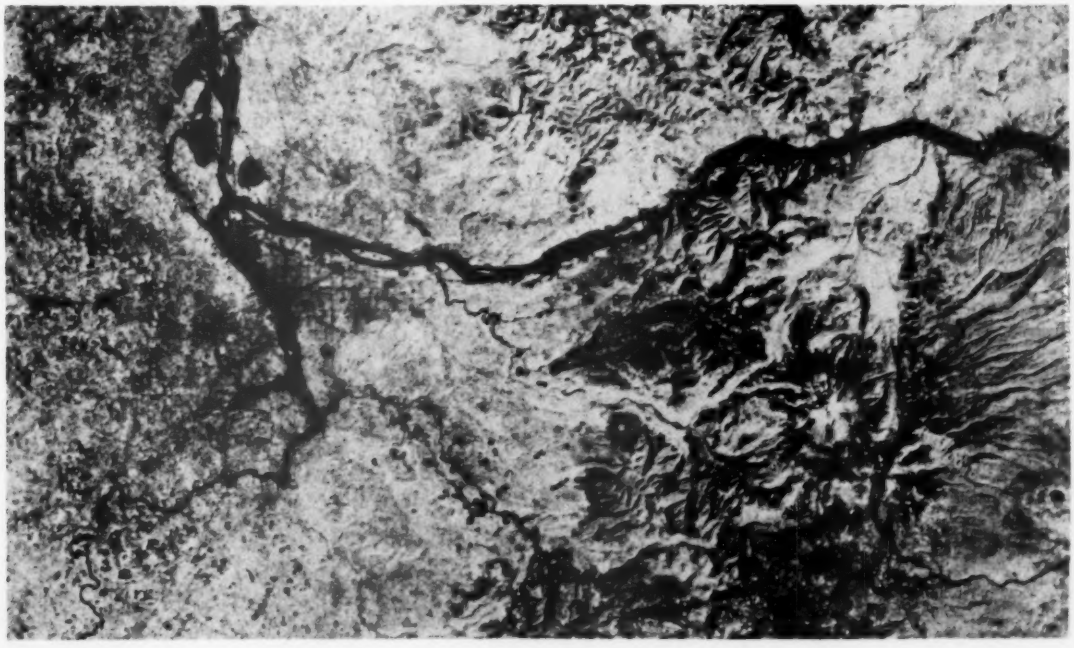
Q. Dr. Welch, I notice that you wince every time I call this thing a map. What do you call it?
A. I call it by its correct name—a mosaic—which is an assembly of continuous tone photographs. On a map, features like roads or vegetation or elevation or towns have been put in there by a cartographer and interpreted for the user. But in a mosaic like this one, you see everything. The detailed interpretation of what you see is left to the user.

Q. But isn't there so much to see that it's hard for an amateur to make anything of it?
A. To some extent, perhaps. But you'd be surprised at the ability of nonprofessionals to relate to what they see on a mosaic, particularly if they can examine it side-by-side with a map of about the same scale. When you start working back and forth from a map to this mosaic, you begin to see lots of interesting things.

Q. What is it that makes the mosaic so exciting to people interested in maps?
A. What SCS has provided us here is the first photoview of the entire United States—if Hawaii will forgive me, because it doesn't include Hawaii—at a base scale of 1:1,000,000. That means that 1 inch on the mosaic is equal to a million inches (1 inch = 16 miles) on the ground. We've never had a view of the United States just like this before.

Q. What are some of the things you see when you step back and look at the mosaic?
A. First, I can see the regions of the country—and their relation to one another—in considerable detail. I can see the regions in terms of natural land forms, not because the geographer has colored the Great Plains yellow and the Rockies purple, but because these regions are really and truly there. That's going to make

In Oregon, Portland and its major roads can be discovered southeast of the confluence of the north-south Willamette and the Columbia rivers. Snowcapped Mount Hood is at the extreme right.



quite an impression on young students, who don't always believe everything you tell them these days.

Q. You mean it will make geography more credible?
A. Absolutely. It will spice it up. And geology, too.

Q. What else can you see?
A. You can see American history. You can see the beginnings of the public land survey, as you move from the irregular field patterns of the first states in the East to the neat rectangular sections in the Midwest and Plains. In southern California, you can see the very intensive agricultural development in the Imperial Valley. The mosaic shows a little bit of Mexico, and you can see that development becomes a lot less intensive and regimented when you cross the border.

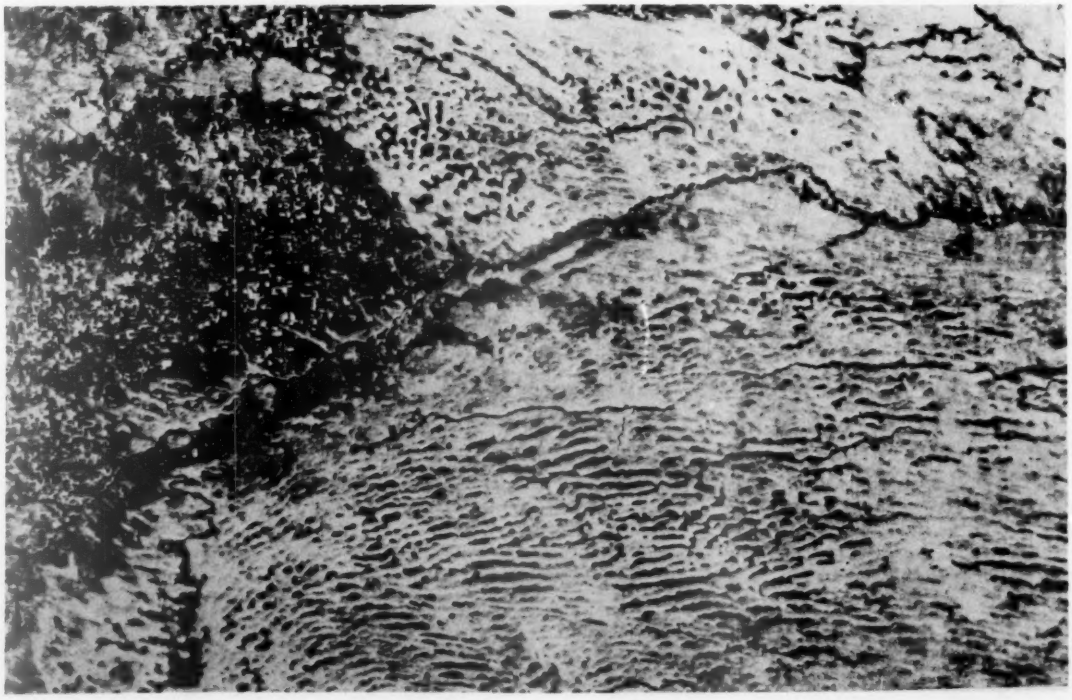
Q. Yes, I can see that. Anything else?
A. Oh, so many things. In the sand hill country of Nebraska, you can actually see the dune pattern, and I don't recall ever seeing that before on a map or mosaic. And in Florida, in the Everglades, you can see a swirl pattern showing not only where water is now, but where it has been. These things are just shown as symbols on conventional maps.

Q. What do you foresee as some of the practical uses of the mosaics?
A. They should be useful to planners. For instance, we might have regional land use planners in three or four states getting together and asking, what's our land use situation in this area. Cultural patterns, like cropland vs. grazing land, stand out very clearly. I can foresee planners looking at this thing and saying: "Here's an area of intensive agriculture, and here it is primarily grazing, and this area is urbanized, and we expect more urbanization to extend from here to here during the next 20 years."

They now have a framework for a broad overall view of regions that they have never had before.

Q. How about geologists?
A. They probably were the first scientists to really appreciate your mosaics. Geologists now

Dune patterns in Nebraska's Sand Hills show clearly in the Band 5 mosaic. Note the abrupt change from cattle grazing country to cropland on the left.



South of the Salton Sea in southern California is the pattern of some of the most intensive irrigated farming in the world—the Imperial Valley. The International Border is clearly discernible in the Band 7 mosaic where the intensity of agriculture changes.

can move continuously from one area to another, instead of studying one area, and then packing up and moving to another. They are tracing faults—geologic, of course—on the mosaic and finding that they go much farther than was suspected—some over a thousand miles. And they have found new faults. In time, they should also learn something about the location of new mineral and water deposits. And flood plains. Scientists, including geologists, consider the SCS mosaics to be one of the first really good applied products to come out of the ERTS program.

Q. Will the mosaics show up errors in existing maps?

A. Yes, minor errors. A real potential lies in revising existing small scale maps, plus the development of new land form maps. The mosaics also could have an impact on aeronautical charts. And they will be used to check and revise the *National Atlas* series, since the SCS mosaics were produced at the same map projection as those in the *Atlas*. That is no small part of their value, by the way.

Q. Dr. Welch, if I were a visitor from another planet, and could get no closer to earth than 560 miles, could I tell for sure that our planet was inhabited? Could I be certain that the United States was occupied by intelligent beings?

A. Oh, sure. Besides making out the field patterns, you can see the outlines of the big cities and other results of man's labor, like highways and Garrison Dam on the Missouri River. You can even make out the freeway pattern in Los Angeles—assuming you consider Los Angeles to be the work of intelligent beings. And a lot of people seem to think it is. ♦

'Tryouts' Underway for Plants to Stabilize Surface-Mined Land in Kentucky

by H. Wayne Everett and Donald S. Henry
Plant materials specialist, SCS, Lexington, Kentucky, and manager, Quicksand Plant Materials Center, SCS, Quicksand, Kentucky

Surface mining is a growing business in Kentucky. The number of stripping permits requested in the first 3 months of 1974 is double that requested during the same period in 1973.

More mining means more land to reclaim. Since 1967, the Quicksand, Kentucky, Plant Materials Center, run by the Soil Conservation Service in cooperation with the University of Kentucky Agricultural Experiment Station, has been developing plant materials to stabilize surface-mined land effectively and economically. What the Center has learned will help in reclaiming the newly mined areas.

Situated in the surface-mined coalfields of eastern Kentucky, the Center began field evaluation plantings on recently graded acid spoil (pH 4.2 to 5.4) in Breathitt and Perry Counties the same year the Center was established—1967. Plantings were made on both leveled and steeply sloping areas.

Tree species showing the best survival and growth rates to date are speckled alder, black locust, sycamore, eastern cottonwood, European black alder, and loblolly pine. Eastern cottonwood is growing more vigorously on sloping than on leveled spoil, probably because the soil on the slopes is more porous.

Shrub species rated best for survival and growth to date are 'Arnot' bristly locust, 'Cardinal' autumn olive, silky dogwood, red-osier dogwood, and fragrant sumac.

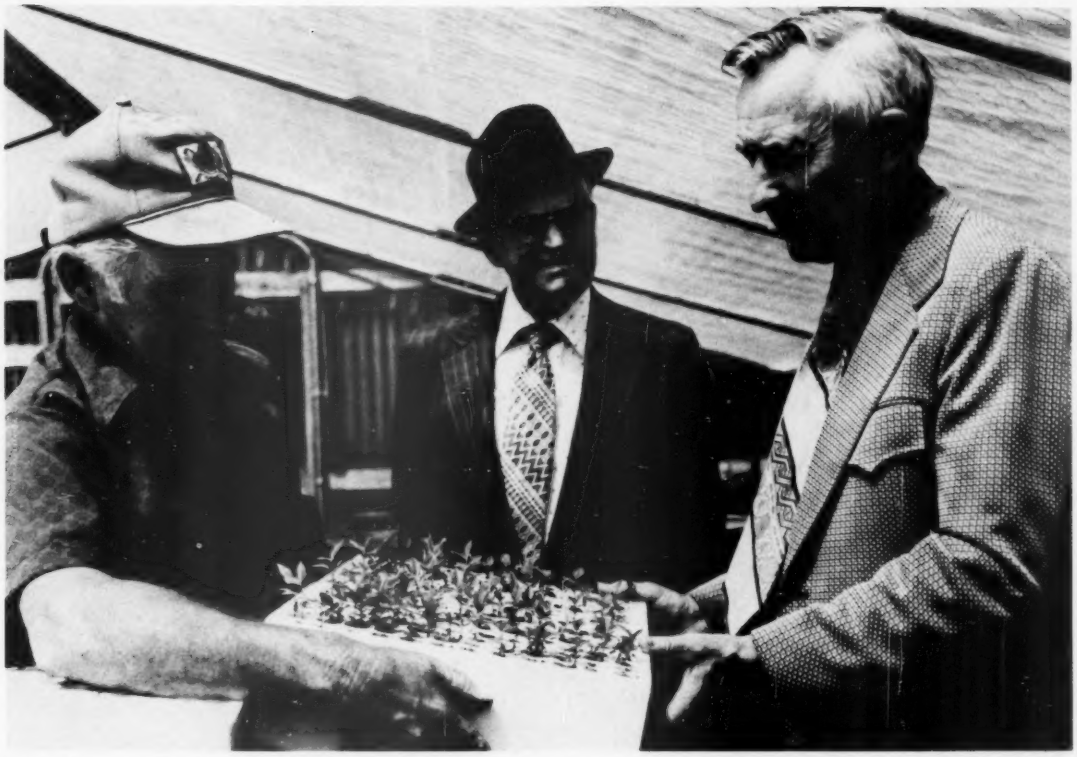
Broadcast seedings of 'Chemung' crownvetch and 'Lathco' flatpea completely covered steep slopes after 3 to 4 years. Dwarf Japanese fleeceflower, an herbaceous perennial, also did well on extremely acid sites.

Soil Conservation Service plant materials centers have recently released two new plants, 'Arnot' bristly locust and 'Lathco' flatpea for use in stabilizing surface-mined land. 'Arnot' bristly locust has been used widely by conservation districts, state reclamation agencies, and mine operators on critically eroding areas. 'Lathco' flatpea is now available in limited quantities from commercial producers in the Northeast.

The demand for such plants is likely to remain strong. The Kentucky Legislature recently voted to require stabilization of deep mine refuse piled on surface land.

Also, the State Legislature has authorized the sale of $50 million in state bonds to finance part of a pilot project to build coal gasification and liquification plants near the Kentucky coal fields. ♦

This stand of 'Arnot' bristly locust, planted as a single row of seedlings seven growing seasons ago, is now 78 feet wide on a strip-mined coal field in eastern Kentucky. It is one of SCS's field evaluation plantings on surface-mined land.



District nurseryman Morris Byrd shows a styrofoam block containing pluglings to Monroe Samuel, NACD Forestry Committee chairman, and M. J. Spears, SCS state conservationist for Arkansas.

Conservation District Raises 'Pluglings'

by Max D. Bolar
Forester, SCS, Little Rock, Arkansas

The Little River Conservation District in Arkansas is raising tree "pluglings" for plantings around the state.

The district expects production to reach 100,000 pluglings a year within the next few years. Currently, some 25 species are grown at the district's greenhouse.

Generally, these species are for beautification—for spring flower and fall color: They include dogwood, redbud, blackgum, sweetgum, lavender (vitex) tree, sumac, golden rain tree, and cherry laurel.

The plugling is a tree seedling grown in a carrot-shaped hole in a styrofoam block.

Planted in a mixture of peat moss and vermiculite, the seedlings are ready to plant in less than 6 months. Two crops can thus be raised annually in each container.

The district's project stemmed from the demand for planting stock by district cooperators in northern Arkansas. With the district greenhouse, cooperators can be assured of a definite supply and selected species.

In addition to meeting demands by its cooperators, the district plans to sell its pluglings at cost to other districts. Districts may then elect to give pluglings to landowners or to seek sponsors, such as civic organizations, to plant species for beautification or for wildlife on public lands.

Two Arkansas state highway districts in the northeast sector of the state have already planted pluglings for beautification purposes along major interstate highways.

The Little River Conservation District set up its nursery to raise the pluglings with the help of two retired Soil Conservation Service employees. Morris Byrd, former plant materials specialist, is now the greenhouse nurseryman and Charley McCollum, retired soil scientist, took charge of constructing the greenhouse. ♦

As the Block 40 Grazing Association was getting started, soil conservationists demonstrated to rancher Robert Lytle (center) how to check the degree of use on the rangeland.

Block 40 Grazing Association

Joint Venture Benefits Ranchers, Range

by Harmon S. Hodgkinson
Range conservationist, SCS, Ephrata, Washington

They've turned a "loser" ranch into a winner.

That's the story of six neighboring ranchers in Block 40 of the Washington State Columbia Basin Reclamation Project.

Together, the six stockmen formed the Block 40 Grazing Association and, financed by the Farmers Home Administration (FmHA), bought a 16,000-acre ranch about 60 miles north of Moses Lake and 10 miles west of Grand Coulee.

The joint venture has enabled the ranchers to expand their home ranches and get maximum use of winter feed grown on their irrigated hayland units. With better grass, the ranchers are finding their calves are 50 to 75 pounds heavier when they come in off the range.

The Block 40 Grazing Association was formed 7 years ago by the six men, all cooperators of the Moses Lake Conservation District: Harry Post, Olaf Odegaard, Robert Lytle, George Zucker, Perry Miller, and Rolf Dilling. All six had previously developed conservation plans on their individual irrigated units with the district.

Upon purchasing the 16,000-acre ranch, they became cooperators with the Foster Creek Conservation District and requested assistance in developing a conservation plan for that ranch.

The district called on conser-

vationists from the Soil Conservation Service, along with representatives from the Washington State Department of Natural Resources, to help the newly formed grazing association develop its range resource management plan.

The plan outlined priorities for introducing conservation practices, setting up an orderly development of the ranch that would meet the ranchers' long-range goals and coordinate resource management with the hayland operations. The Farmers Home Administration furnished economic evaluations and support.

Early work included range seedlings, water developments, brush management, and developing of a planned grazing system.

Range seedlings. One of the major requirements of FmHA-financed grazing associations is that all cropland be seeded to grass. Thus, about 1,200 acres of abandoned cropland and poor condition rangeland were seeded to grasses that balance the green feed period.

'Nordan' crested wheatgrass and Siberian wheatgrass were planted for spring use, since the key native grass, bluebunch wheatgrass, is the summer and fall forage in the association's grazing system.

One area which had some native bluebunch wheatgrass was seeded to an improved strain, 'Whitmar'.

Good land preparation, combined with proper timing of seeding and deferment from grazing, contributed to quick, successful stands.

Water developments. Eight springs were developed and two wells were drilled to provide adequate water and to distribute grazing more uniformly. Five miles of pipeline and 25 troughs were installed.

SCS's L. W. Tilden checks grass-legume seeding on the Block 40 grazing unit during its first year of operation.

One year, when the springs and ponds went dry, shallow wells were dug in the pond sites and a portable LP-gas engine pump automatically kept the stock tanks filled with clear, fresh water.

The association found successful grazing and efficient livestock distribution were feasible with good watering facilities.

Brush management. About 1,000 acres of dense sagebrush have been brought under a brush management program. Usable forage yields have tripled.

Careful consideration was given to sage grouse habitat in these projects. Strutting grounds for the grouse were identified and not sprayed.

As a result of complete planning, both wildlife and livestock needs were improved.

Planned grazing system. Each fall after the cattle are removed, association members and agency representatives check to see how the range is used. This helps in the development of the grazing schedule for the next season. The schedule guides the ranchers to the sequence of moving cattle so that each pasture is deferred in its turn during the green-growth period. Under this system, about 4,500 acres are deferred each year.

The use checks show that the association is grazing 15,000 acres properly each year.

The association members have been flexible in achieving such proper grazing practices. On one occasion, after following a planned grazing system through a drier year than expected, the ranchers took their cattle home a month and a half early to avoid overgrazing.

On another occasion, when a short grass year was anticipated, association members cut back their cattle numbers before putting them onto the summer range.

As a result of following scheduled grazing and proper use plans and meeting yearly goals, the Block 40 Grazing Association has seen a number of improvements on its ranch.

Plant vigor has improved, forage production increased, and beef production has climbed. By the end of the grazing season, when the calves are sold, they weigh 450 to 475 pounds—compared with the 400 pounds weight the ranchers were selling them at prior to their joint venture.

The range resource on the 16,000-acre ranch has been improved through consistent conservation during the last 7 years. Other benefits achieved include erosion control, water conservation, improvement of soil fertility, and improved wildlife habitat. ♦

'Cape' American Beachgrass Anchors Dunes

by Frederick B. Gaffney
Manager, Cape May Plant Materials Center, SCS, Cape May Court House, New Jersey

A new beachgrass is "making waves" along the East Coast.

It's commonly called 'Cape'—for it was discovered and collected on Cape Cod, Massachusetts, in 1965 by W. Curtis Sharp, plant materials specialist for the Soil Conservation Service.

It's a variety of American beachgrass, which is an important sand-binding grass from Newfoundland to North Carolina. American beachgrass fits into the early plant succession of sand dunes and is frequently the first perennial grass to appear on dunes.

Culms of 'Cape' American beachgrass are correctly planted 7 inches into the sand.

What makes 'Cape' different from other American beachgrasses is that in comparison with 50 other beachgrass collections, it has proved superior in both stabilizing existing dunes and building new ones.

It produces many large-diameter culms—or stems—and long, broad, lax, deep-green leaves—all distinguishing marks from other strains of American beachgrass. The large culms contain a plentiful supply of food reserves and provide for a high survival rate for transplants.

'Cape' also has more culms and leaves than common American beachgrass. This increased vegetation reduces the wind velocity near the beach surface, resulting in heavier sand deposits; thus new sand dunes.

'Cape' American beachgrass was released in 1972 jointly by SCS's Plant Materials Center in Cape May Court House, New Jersey, and by Rutgers University, New Brunswick, New Jersey.

SCS recommends its use for stabilizing sand dunes and for building new ones. Three culms per hill are planted 6 to 8 inches into the sand. This depth of planting prevents the transplants from being blown out. Either 12- or 18-inch spacing between hills has given good results. Fertilizing soon after planting, with a high nitrogen fertilizer, has aided initial growth of the plants and provided "instant" protection to the dunes. ♦

Recon . . .

Fish farm facts. An SCS summary of fish farming activity in the United States reveals that there were 2,372 commercial catfish enterprises covering 259,128 acres as of April 15 of this year. There were 935 trout farms with 4,214 acres of trout; 853 minnow farms with 48,899 acres of commercial minnow production; and 564 other fish farms with 31,045 acres in 34 other kinds of fish. About 3,740 enterprises offer fee-fishing recreation. Although still a comparatively new type of agriculture, "aquaculture" now covers an acreage equal to half the acres devoted to farming in Delaware.

EPA-TVA to study heated water and fish. The Environmental Protection Agency and the Tennessee Valley Authority will study the effect of heated water on fish in two large-scale research projects in Tennessee and Minnesota. The Tennessee study will be to determine the effects of heated water discharges on the growth, reproduction, and survival of fish and other aquatic life in the waters of the southeastern United States. The Minnesota study will concentrate on the same problem, although with fish typical of northern waters. Scientists know that water temperatures vary with changes in weather and the amount of water flowing at any given time, and that, in fact, these changes are essential to aquatic life. However, when the entire temperature cycle is raised—such as from a power generating plant—aquatic life may suffer. Some heat added to the water can be beneficial, but biologists are concerned that the impact of increasing heat loads could be detrimental. The EPA-TVA study will attempt to pinpoint the problem levels for several species of fish.

Soil stops. A "Soils Tour" in Arizona recently gave SCS people an opportunity to tell planners and engineers about the types of soils in central Maricopa County and the uses that can be made of soil surveys.

Loaded onto a bus, the group —led by a team composed of a soil conservationist, soil scientist, engineer, and district conservationist—made a number of stops, digging holes with an auger and shovels, and comparing soils.

One preselected site on cropland revealed a caliche hardpan which provided an opportunity to discuss on the spot the limitations of the spot for septic tanks and buildings.

The first tour proved so successful that another was held for realtors.

Sod-seeding on stony sites. When sites are too stony, how about no-till production? Penn State reports several facets of no-till crop production under investigation there appear promising. At one site with several limestone outcrops that prevent use of conventional tillage techniques, researchers applied a contact herbicide and then seeded the area with alfalfa, birdsfoot trefoil, and crownvetch in July of 1971. The species were well established by winter. After some experimentation to control perennial broadleaf weeds, the researchers found that by 1972, the yields from the plantings were comparable to those obtained from conventionally seeded alfalfa, crownvetch, and birdsfoot trefoil at the research farm.

Organic ground. Why is humus so important to productive soil . . . how much is necessary . . . what are the possibilities offered by sewage sludge, chicken manure, and stable manure?

These are all questions a research scientist at the University of Georgia's College Experiment Station is looking into on a five-year project to study the rate of decomposition and adsorption of organic material in soil as well as all resultant chemical changes.

The scientist, Dr. Kim H. Tan, is expanding on previous work he did on the use of chicken manure as a raw organic addition to soil. In that study, he determined that 200 metric tons of chicken manure could be used per hectare (one hectare equals 2.471 acres) without fear of pollution.

Soil surveys

Alabama

Talladega County. By James A. Cotton, Lewis A. Dungan, Glenn L. Hickman, and Charles F. Montgomery. 1974. Soil Conservation Service and Forest Service in cooperation with Alabama Agricultural Experiment Station and the Alabama Department of Agriculture and Industries. 101 pp., illus.; maps.

Arizona

Long Valley Area. By L. D. Wheeler, Jr., and John A. Williams. *1974. Soil Conservation Service and Forest Service in cooperation with Arizona Agricultural Experiment Station. 78 pp., illus.; maps.*

California-Nevada

Surprise Valley-Home Camp Area. By H. B. Summerfield, Jr., and D. G. Bagley. *1974. Soil Conservation Service and Forest Service in cooperation with University of California and University of Nevada Agricultural Experiment Stations and USDI-Bureau of Land Management. 130 pp., illus.; maps.*

Indiana

Elkhart County. By Frank Kirschner and Paul McCarter. *1974. Soil Conservation Service in cooperation with Purdue University Agricultural Experiment Station. 96 pp., illus.; maps.*

Kansas

Chase County. By James T. Neill. 1974. Soil Conservation Service in cooperation with Kansas Agricultural Experiment Station. 65 pp., illus.; maps.

Louisiana

Evangeline Parish. By B. Arville Touchet, Henry L. Clark, Carl M. Redlich, A. J. Roy, Billy J. Griffis, Steve J. Zaunbrecher, and Richard M. Hollier. *1974. Soil Conservation Service in cooperation with Louisiana Agricultural Experiment Station. 68 pp., illus.; maps.*

Maryland

Charles County. By Richard L. Hall and Earle D. Matthews. 1974. Soil Conservation Service in cooperation with Maryland Agricultural Experiment Station. 94 pp., illus.; maps.

Mississippi

Chickasaw County. By L. C. Murphree, J. S. Huddleston, and L. H. Nichols. *1974. Soil Conservation Service and Forest Service in cooperation with Mississippi Agricultural and Forestry Experiment Station. 68 pp., illus.; maps.*

Nebraska

Webster County. By Harry E. Paden and Larry G. Ragon. *1974. Soil Conservation Service in cooperation with University of Nebraska Conservation and Survey Division. 72 pp., illus.; maps.*

New York

Wyoming County. By John P. Wulforst, John A. Phillips, Willis E. Hanna, Paul Puglia, and Leslie Crandall. *1974. Soil Conservation Service in cooperation with Cornell University Agricultural Experiment Station. 199 pp., illus.; maps.*

North Carolina

Wayne County. By William L. Barnhill, Roy A. Goodwin, Jr., Marcus R. Bostian, Niles A. McLoda, Garth W. Leishman, and Richard J. Scana. *1974. Soil Conservation Service in cooperation with North Carolina Agricultural Experiment Station. 72 pp., illus.; maps.*

Ohio

Monroe County. By Ernest N. Hayhurst, Thomas N. Rubel, Glenn E. Kelley, and Paul Beining. *1974. Soil Conservation Service and Forest Service in cooperation with Ohio Department of Natural Resources, Division of Lands and Soil, and the Ohio Agricultural Research and Development Center. 123 pp., illus.; maps.*

Texas

Hemphill County. By Jack C. Williams, Anthony J. Welker, Frankie F. Wheeler, and Harry F. McEwen. *1974. Soil Conservation Service in cooperation with Texas Agricultural Experiment Station. 55 pp., illus.; maps.*

Travis County. By Leroy E. Werchan, A. C. Lowther, and Robert N. Ramsey. *1974. Soil Conservation*

Service in cooperation with Texas Agricultural Experiment Station. 123 pp., illus.; maps.

Wisconsin

Rock County. By Robert J. Engel, Howard F. Gundlach, Keith O. Schmude, Carl L. Glocker, Edward L. Weber, and Frank L. Anderson. 1974. Soil Conservation Service in cooperation with University of Wisconsin Department of Soil Science, Wisconsin Geological and Natural History Survey, and Wisconsin Agricultural Experiment Station. 160 pp., illus.; maps.

Reviews

Snow Survey Safety Guide. *Revised, 1974. USDA Agr. Hbk. 137. 60 pp., illus.*, $0.85. This pocket-size reference, designed primarily for snow surveyors, contains information about how to travel and work safely in snow and low temperatures. It also discusses rescue procedures and first aid to give when emergencies occur in remote areas where medical assistance is not available.

Our Land and Water Resources: Current and Prospective Supplies and Uses. *1974. USDA-Economic Research Service. Misc. Pub. 1290.* This report includes a current summary of national rural land and water uses, estimates of future land and water requirements to meet agricultural production needs, and an examination of problems stemming from competing uses and environmental conflicts.

Meetings

September

22–26	*National Association of State Departments of Agriculture, Milwaukee, Wis.*
22–27	*SCS State Conservationists Annual Meeting, Lexington, Ky.*
22–27	*Association of Conservation Engineers, Rapid City, S. Dak.*
29–Oct. 2	*American Forestry Association, Mackinac Island, Mich.*

October

5–8	*National Environmental Sanitation & Maintenance Educational Conference, Chicago, Ill.*
6–11	*Water Pollution Control Federation, Denver, Colo.*
9–13	*American Horticultural Society, Arlington, Va.*
10–11	*American Forest Institute, Minneapolis, Minn.*
11–14	*National Association of Biology Teachers, Inc., New York, N.Y.*
12–15	*Farm and Industrial Equipment Institute, Orlando, Fla.*
14–17	*American Society for Testing and Materials, Detroit, Mich.*
15–18	*Future Farmers of America, Kansas City, Mo.*
15–18	*National Conference of Editorial Writers, Louisville, Ky.*
15–18	*National Recreation Research Applications Workshop, Copper Mountain, Colo.*
20–24	*National Association of County Agricultural Agents, Tucson, Ariz.*
20–25	*National Congress for Recreation and Parks, Denver, Colo.*
21–25	*Association of Engineering Geologist, Denver, Colo.*
21–25	*American Society of Civil Engineers, Kansas City, Mo.*
23–26	*National Council for Geographic Education, Chicago, Ill.*
27–30	*Sprinkler Irrigation Association, Lake Buena Vista, Fla.*
28–30	*American Plywood Association, Houston, Tex.*
31–Nov. 1	*American Association for Vacational Instructional Materials, Atlanta, Ga.*

November

1	*Environment and Safety Briefing Session, Loew's L'Enfant Plaza Hotel, Washington, D.C.*
4–8	*Adult Education Association of the U.S.A., Miami Beach Fla.*
5	*American Seed Trade Association Conference, Kansas City, Mo.*
10–13	*American Bankers Association National Agricultural and Rural Affairs Conference, St. Louis, Mo.*
10–15	*Joint Meeting of American Society of Agronomy, Soil Science Society of America, and Crop Science Society of America, Chicago, Ill.*
11–18	*National Grange, Sacramento, Calif.*
13–14	*Thirteenth Annual Purdue Air Quality Conference, Indianapolis, Ind.*
18–20	*Geological Society of America, Miami Beach, Fla.*
18–20	*American Association of State Highway Officials and Transportation Officials, Detroit, Mich.*
18–22	*Tenth American Water Resources Conference, Puerto Rico*
19–23	*Park Interpreters' Institute, Texas A&M University, College Station, Tex.*

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